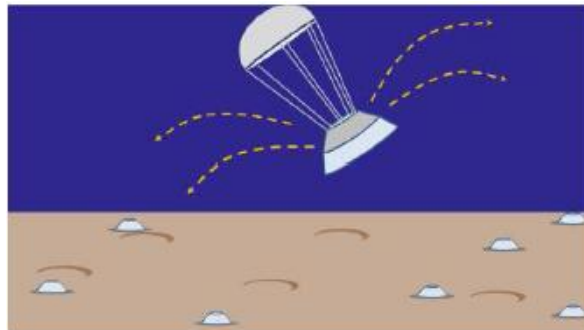


NAVIGATION SYSTEM FOR EXPLORING AND/OR MONITORING UNKNOWN AND/OR DIFFICULT ENVIRONMENTS

Main Technological Area —> Positioning

Keyword —> Transportable navigation system for exploration-monitoring | Low Cost Wireless Sensors

The solution refers to a transportable navigation system for monitoring and exploring impassable or unknown places like surfaces of celestial bodies, underwater areas, areas subject to disasters such as earthquakes, floods, volcanic eruptions or tsunamis (therefore changed from the previous known configuration). The operations can be performed through a reliable navigation and positioning system based on low-cost, human-neutral wireless sensors for deployment, which can also be used as a standard, moved or added in case of need to enlarge the area of operations. The navigation system can be integrated with unmanned or unmanned vehicles.



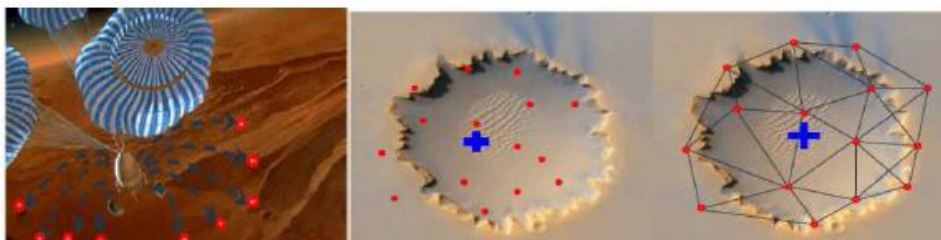
TECHNICAL FEATURES

The proposed system includes :

- a mission control module (for the space a lander) to be positioned in places unknown or difficult to reach;
- an unmanned vehicle (rover) for carrying out operations;
- a primary communication node coupled to the control module;
- several secondary nodes (beacons) to be positioned in the area of operations.

The technological devices of the system act in coordination with each other through the use of radio interfaces based on ultra-wideband (UWB) technology, which interact with each other and form a network of communication where the hierarchy of the nodes guarantees the correct operation of the system of positioning and navigation.

The primary communication node, which is part of the control module, is configured to carry out geographical position measurements, to be communicated to the unmanned vehicle on the basis of data sent from secondary nodes whereby is in hierarchical communication. The mission control module, which in case of spatial application will be on a lander, is configured to send mission data to the vehicle without crew, including navigation data and The system is equipped with a short range radio interface and a built-in a long-range secondary interface, both based on ultra-wideband (UWB) technology. However, the Mission control module can also support different radio communication systems. The module compute the position of the rover through the navigation data received from the network and pilot it in the performance of the mission.



Secondary nodes play an important role in carrying out geo-localisation measurements using their own broadband interfaces, relating to the nodes of the same hierarchical level and communicating to the node primary data relating to the measurements made; they are also equipped with wireless communication tools equipped with short-range radio interface with UWB technology.

The unmanned vehicle shall comprise a control unit with a communication interface configured for communicate with the mission control module, using the ultra-wide band; in particular, the rover is equipped with both short range interface, and long range secondary interface

INNOVATION/BENEFITS

- *UWB Radio : simultaneous communications, resilience to interference, accuracy*
- *Ad-hoc wideband protocol stack : fault tolerance and reorganization*
- *Autonomous system for computation and algorithm integrity*
- *Navigation algorithms for the PLaNS system*

AREAS OF USE

- Operational Coordination to build extraterrestrial or terrestrial sites
- Safe landing systems on oil platforms
- Communication systems in mines and underground sites
- Tunnel mapping and dynamic and static location for vehicles inside
- Control of maritime traffic through a system of floating beacons to be applied in canals, ports and rivers
- Tracking and monitoring of sports vehicles
- Support in coordinating rescue operations
- Soil or area exploration and mapping through tracking sensors
- Support in landing Drones/UAVs on moving vehicles
- Relative position of vehicles

PATENT INFORMATION

Priority Date – 2011/07/18

Priority Number - IT TO2011A000645

IPC Codes – G01S 5/02

Active Worldwide Extensions

EPO - EP2549286B1; Filing Date: 2012/02/18; Grant Date 2017/01/04

Belgium – Swiss – Germany – Danemark – Spain – Finland – France – United Kingdom – Italy –
Olanda – Polonia - Romania - Svezia

USA US8473118; Filing Date: 2012/07/18; Grant Date 2013/06/25

Leonardo internal code

TASI-001

Leonardo References

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